Introducing Mobile DTV

Driving the Convergence of the Mobile and Broadcast Industries

roundbox®

Mobile DTV: The Next Generation of Broadcast TV

Mobile DTV presents broadcasters an exciting and lucrative new opportunity. While the recent transition to digital TV laid the foundation for delivering HD to 100 million households, Mobile DTV enables stations to reach a new generation of 300 million mobile video devices with television content as well as interesting new interactive services.

The new services will leverage a wave of technological advances within mobile media and return local broadcast to the forefront of content delivery. In the U.S., we are about to experience the second coming of the free-to-air, ad-supported television model that changed the world nearly 70 years ago.

Record Ratings

While online, Internet-delivered video has created an important new category for media consumption, the bulk of consumer video remains broadcast television. For example, in Feb. 2009, AC Nielsen noted that the average consumer watched a record 151 hrs. of TV per month and approximately 5 hrs. per day. By contrast, online video consumption is estimated to be 4 hrs. per month.

U.S. Television Usage at Record Levels Nielsen 3-Screen Report 2nd Quarter 2009

The Local Broadcast Television Market

Broadcast TV was the pioneer of the free, ad-supported content model. Today, despite the rise of online video, portable media players and other devices, broadcast remains the strongest consumer media market.

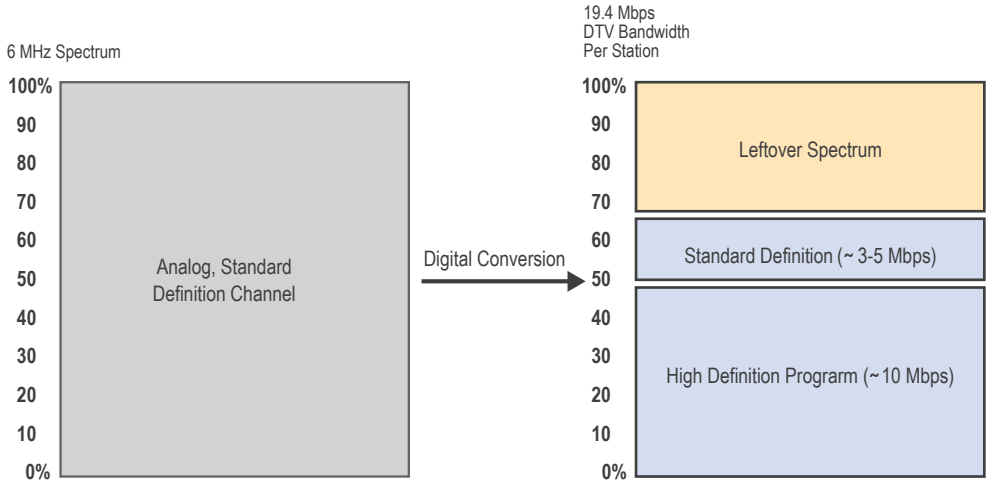
Originally established in the 1930s and 1940s, broadcast TV consisted of a network of local affiliate stations, which created local content and carried programming from nationwide networks. Content was offered free to consumers and supported by advertising sales.

By 2008, the model had mushroomed into $40 billion/year market in the U.S. with nearly half of the revenues going to the nation's 1,800 local TV stations. Although originally independent, many local stations are now owned by different nationwide station groups. The top five groups generated revenues of over $1 billion each with New York's WNBC station alone generating $340 million in revenues.

Digital Has Finally Dawned

Individual stations are licensed a 6 Mhz swath of spectrum which, prior to 2009, delivered a single analog TV channel. After the digital transition, this slice of spectrum is now encoded digitially providing stations 19.4 Mbps of capacity. However, codec advances mean that a typical TV station only requires about 10 Mbps of bandwidth to deliver an HD channel and 3 Mbps to deliver a standard definition channel. As a result, many stations have between 5 and 15 Mbps of leftover bandwidth per station.

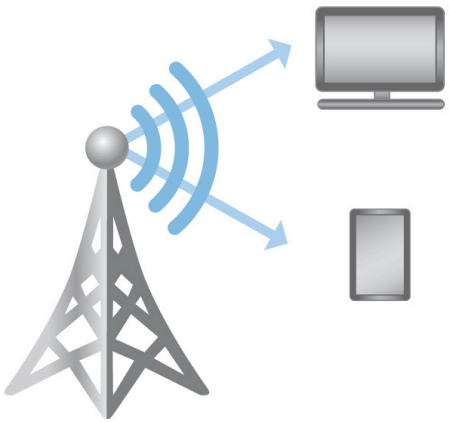
TV is the original and remains one of the most pervasive wireless networks in the U.S. A typical top 25 metro area, for example, usually contains over 20 local TV stations and the top 100 metros often have over 15 stations each.



However, while broadcasters transitioned to digital TV, consumers continued shifting away from rooftop antenna TV to cable, satellite, and fiber services. Currently, over 80% of homes in the U.S. receive their programming via these services. The demand for HDTV promises to catapult penetration of such services to over 95%.

So what's next for broadcasters?

The Answer Is Mobile DTV



Roundbox believes the next phase of the broadcast industry's evolution will be mobile. Mobile DTV extends the reach of local broadcast television from homes to a new generation of mobile media devices.

By taking advantage of investments already made in their digital transmission infrastructure, broadcasters can enter the market quickly with investments as low as $150K per station. Then, by transmitting a mobile-optimized signal over available bandwidth, stations gain access to a massive new audience.

Mobile DTV extends terrestrial DTV in several ways:

- **IP-based** – While terrestrial TV was built on MPEG-2 transport, Mobile DTV instead leverages IP and Internet technologies to deliver audio, video, and a variety of data payloads.
- **Power management** – Terrestrial TV was built assuming AC power connected devices, by contrast, Mobile DTV signals contain optimizations to assist reception by battery-powered devices.
- **Mobility** – Terrestrial TV often assumes signal reception by large, stationary, rooftop antennas. Mobile DTV incorporates a variety of techniques including Doppler compensation to ensure reception in moving vehicles and by smaller devices.
- **Screen size** – While HDTV targets large displays, the H.264 video in Mobile DTV focuses on laptop-sized screens and smaller.

The result is new mobile network technology optimized for the delivery of a wide variety of content to consumers.

Mobile DTV Delivers More Than TV

Mobile DTV initially offers consumers a simulcast experience. The same programming from major television networks – NBC, Fox, ABC, CBS, PBS, CW, UPN, and others – is simultaneously broadcast to homes and mobile devices. The existing ad-supported business model is untouched and extended to the mobile audience.

However, because Mobile DTV is IP-based, traditional TV represents just one type of content that can be broadcast. An exciting extension to Mobile DTV is Non-Real Time (NRT) services, also known as Mobile DTV Widgets.

Widgets are files, rather than audio/video streams, transmitted over-the-air and downloaded to the mobile device. Widgets can deliver almost any type of Web content including media clips, Web pages, RSS feeds, maps, graphics and so on. This content model readily leverages station investments in Web content, which now represents up to 10% of total revenue for some of the leading broadcasters.

Mobile DTV Widgets provide web-like, on-demand access to station data while leveraging the reach and economics of broadcast.

Soon to Tune In

Mobile DTV can be added to a video-capable mobile device at a very low cost. A huge percentage of mobile devices are already video-enabled, suggesting millions will soon be capable of tuning in Mobile DTV.

Mobile phones	*75%*
MP3 / Media players	*75%*
Laptops	*100%*
Portable game players	*75%*
Portable DVD players	*100%*
Auto	*10%*

Vizio Adds ATSC M/H to its Portable Televisions in the U.S.

...The move emphasizes just how cheap it is to add a mobile TV chip to any device which already has a processor and screen, and bodes well for the ATSC M/H mobile TV market being well supplied with diverse devices.

Unthinkable Biz, January 13, 2010

The Market is Emerging Fast

In order to capitalize on Mobile DTV opportunities, several organizations are working to establish the necessary technical and ecosystem elements.

The Advanced Television Systems Committee (ATSC) led the development of technical specifications for Mobile DTV and announced a candidate standard in January 2009, which was subsequently ratified. The ATSC standard defines use cases for channel scanning, program data acquisition and certain types of program interactivity. The ATSC is also separately standardizing Non-Real Time (NRT) as a model for file-based content distribution over broadcast.

MDTV™ MOBILE DIGITAL TELEVISION

In parallel, the Open Mobile Video Coalition (OMVC) was formed to advance Mobile DTV. The OMVC consortium includes more than 800 local broadcast stations committed to mobile video. Members of the coalition represent 96% of the top 100 DMAs (Designated Market Areas).

The Progress of Mobile DTV in Japan and Korea

For a preview of how Mobile DTV might evolve in the U.S., we'll briefly set our sights on the Far East. In both Japan and Korea, Mobile DTV was launched in 2005. The Japanese and Korean people embraced it fast and enthusiastically. Within three years, over one third of the population had purchased and now receives mobile DTV services.

In Japan, where population is 50 million, by the end of 2008, over 40 million Mobile DTV devices were in use. All three major Japanese mobile operators provide a large portfolio of local mobile DTV-capable mobile phones and customers have responded by watching over an hour a day of content.

The analyst firm ARCchart in a February 2009 research note projected the lesson these markets portend for the U.S.–

> "For the U.S. to achieve a similar penetration rate to either Japan or Korea, it would have to sell over 100 million broadcast Mobile TV devices in the next three years... we expect [ATSC-M/H] to rocket to half a million customers in its first full year."

The Time is Now for Mobile DTV

2010 will be the year the U.S. experiences the emergence and fast growth of Mobile DTV, much like Asia a few years ago. The market presents opportunities across the value chain. Device manufacturers will offer an exciting new feature. Mobile operators will offer customers a new experience. Most importantly, broadcasters will have a new audience – a massive one.

Today's broadcasters reach about 100 million households generating $40 billion in revenue. The potential number of Mobile DTV devices is three times the size, that is, over 300 million devices. The potential for ad-generated revenues is clearly enormous.

The business presents next to no barriers. All consumers will require is a device to tune into TV for free. Broadcasters will leverage an existing business model and network infrastructure with the need for only modest investments to broadcast IP-based television content.

FAQ: Isn't 3G / 4G the Answer for Mobile Video?

While 3G, 4G and other mobile broadband technologies enable a variety of mobile consumer data services, broadcast media will still have a crucial role in delivering video to consumers on the go. One large reason stems from the physics and economics of wireless spectrum.

3G networks, for example, deliver consumer bits at roughly $0.02 per MB. At that rate, a typical YouTube session of 5 minutes of 15 Fps QVGA video generates roughly $1.00 in over-the-air transport cost. 4G networks are estimated to bring the cost per bit down by an order of magnitude resulting in $0.10 in cost for 5 minutes of video.

By contrast, Mobile DTV's broadcast technology results in a $0.00 marginal cost per user.

Thus, while 3G and 4G have an important role in high value Video-on-Demand (VOD) services, these cost points prevent them from delivering mass-market mobile video – particularly with the viewing patterns anywhere near terrestrial TV or those found in Japan and Korea. As a result, Mobile DTV will be a long-term compliment to 3G and 4G for the mass market.

Roundbox Provides a Path to Mobile Broadcast

Roundbox is the leading provider of mobile broadcast software for broadcasters, mobile operators, and device manufacturers. Roundbox is playing a pivotal role in creating a new generation of mobile broadcast services with products that empower customers to deliver innovative mobile broadcast applications. Roundbox software and services help broadcasters maintain their presence in a complex technological landscape and leverage existing assets into new revenue streams.

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